REMARKS

Reconsideration and allowance of the subject application in view of the foregoing amendments and the following remarks is respectfully requested. Claims 1-22 remain pending. The specification has been amended to correct minor grammatical errors. No new matter has been introduced by these amendments.

The rejection of claims 1-22 under 35 USC 103 (a) as being unpatentable over Eppler (U.S. Patent 6,084,989) in view of Szeliski et al (U.S. Patent 6,157,747) is hereby traversed.

Applicant's attorney has performed a detailed review of the Eppler reference and has been unable to identify where in the reference: 1) a sequence of video frames is extracted, 2) the video frames are aligned, or 3) the aligned video frames are used to create a single image, as asserted by the examiner.

1 First, contrary to the examiner's assertion, patch extractor 17 extracts a single image patch, a 25 line by 40 pixel block of pixels, from a very large image, approximately 10,000 lines by 20,000 pixels. This is not the same as extracting a sequence of video frames as claimed in claim 1.

2 Second, with respect to the alignment of video frames, Eppler is directed not to aligning interpolated video frames, but to determining a match between a predicted landmark from a geographic information system, i.e., worldwide, seamless, thematic, vector maps input to a common mapping tool kit to generate that icon representing a 12 line by 21 pixel image, and an actual landmark in an image patch. There is no alignment of interpolated video frames in the Eppler reference as claimed in claim 1.

3 The examiner attempts to overcome the deficiency of Eppler by combining Szeliski with Eppler; however, Szeliski is directed to constructing a mosaic image from a set of plural images captured by a camera looking at the same scene but oriented at different angles. That is, Szeliski describes a method of stitching together a plurality of images. This is not the same as aligning an extracted sequence of video frames as claimed in claim 1.

Further, the Examiner has failed to identify a teaching, suggestion, or motivation for making the asserted combination of Eppler with Szeliski. In particular, the examiner has failed

2 to identify a teaching, suggestion or motivation for combining the satellite based landmark detection system of Eppler with the image mosaic creation method of Szeliski. Both systems deal with images; however, Eppler attempts to determine the position of landmarks in satellite images using digitized maps while Szeliski stitches together a plurality of damages to construct a continuous mosaic image. A person of ordinary skill in the art would not be motivated to combine the teachings of the references.

A statement that modifications of the prior art to meet the claimed invention would have been well within the ordinary skill of the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references. See MPEP 2143.01 quoting Ex parte Levengood, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). The Office Action merely stated that the references can be combined, which Appellants contend to the contrary, and does not state any desirability for making the combination. In other words, the Office Action failed to supply any objective reasons to combine the applied references. Accordingly, the Examiner is requested to identify where, in either reference, there is a teaching or suggestion of the asserted combination.

3 Third, with respect to the creation of a single image from the aligned video frames, Eppler is directed to a system for automatically determining the position of landmarks in digitized images from satellite-based images. That is, Eppler uses digitized images to identify landmarks in satellite images. There is no creation of a single image using the aligned video frames as claimed in claim 1.

The examiner attempts to overcome the deficiency of Eppler by combining Szeliski with Eppler, as described above. Szeliski is directed to joining together a plurality of images into a mosaic and not to combining aligned video frames into a single image as claimed in claim 1.

For any of the above reasons, the invention as claimed in claim 1 is patentable over the applied combination of references and the rejection should be withdrawn. Claims 2-19 depend, either directly or indirectly, from claim 1and are patentable over the applied combination of references for the reasons advanced above with respect claim 1, include further import limitations, and the rejection should be withdrawn. Independent claims 20-22 per patentable for

reasons similar to those advanced above with respect to claim 1 and the rejection to be withdrawn.

Specific reference is now made to the rejection of dependent claims 2, 5-8,,11,12-15, and 18-19; these rejections are now addressed ad seriatum.

With reference to claim 2, the examiner argues that Eppler inherently includes a sequence of video frames that are low resolution images because the Eppler system produces a "higher resolution display" (column 13, lines 16-22). The examiner is incorrect because the higher resolution display referred to is the map used by an operator to create the digitized landmark map. In fact, the images used in Eppler, "are very large, and are approximately 10,000 lines by 20,000 pixels."

With reference to claims 5, 12, and 19, the examiner argues that extracting the sequence of video frames at 30 frames per second is inherent because this rate is standard in video/television systems. However, the examiner has not identified any reference teaching extraction of a sequence of video frames, nor the extraction of such frames at 30 frames per second. Further specifically, neither applied reference teaches using a video/television system capturing sequences of video frames at 30 frames per second.

With reference to claims 6 and 13, the examiner argues that it would be design choice to specify a number of video frames in a sequence; however, nowhere in either of the references is there a teaching of extracting a sequence of video frames.

With reference to claims 7 and 14, the examiner argues that the cross correlation algorithm of Eppler performs the step of correlating the upsampled video images. The cross correlation algorithm in Eppler is used to correlate a landmark mask with a potential landmark in an image patch, there is no correlation of a sequence of upsampled video frames.

With reference to claims 8 and 15, the examiner argues that Eppler averages a pixel intensity from each of the upsampled video frames at column 9, lines 31-33. However, the examiner cited location of Eppler describes that the average and variants computed for pixel values within the landmark perimeter. This is not the same as averaging a pixel intensity from each of the upsampled video frames.

With reference to claims 11 and 18, the examiners rationale for combining the references is not understood. The examiner is requested to clarify his reasoning.

All objections and rejections having been addressed, it is respectfully submitted that the present application should be in condition for allowance and a Notice to that effect is earnestly solicited.

Respectfully submitted,

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MARKED-UP VERSION SHOWING CHANGES MADE

IN THE SPECIFICATION:

Please replace the paragraph beginning on page 8, line 3 with the following:

Computer system 100 can send messages and receive data, including program code, through the network(s), network link 120 and communication interface 118. In the Internet example, a server 130 might transmit a requested code for an application program through Internet 128, ISP 126, local network 122 and communication interface 118. In accordance with the invention, one such downloaded application provides for an image enhancement process used in conjunction with a video mosaic process [information discovery and visualization] as described herein.

Please replace the paragraph beginning on page 9, line 3 with the following:

Refer now to Figures 6A and 6B showing the process of the present invention. At step 605 the process is started. A step 610, individual frames are extracted from the library. As depicted in Figures 2A and 2B, frames 200 and 250 were extracted from the library. At step 615, the extracted individual frames are converted to a black and white format. At step 620, edge detection is performed by detecting change in [and] intensity from one pixel to adjacent pixels. As depicted in Figures 3A and 3B, the outlines of various structures are detected. At step 625, lines are drawn at changes of intensity as depicted in Figure 3. At step 630, regions of interest are determined. At step 635, the regions of interest are correlated as explained with reference to Figures 7A and 7B. At step 640, image registration is performed by compensating for platform/camera movement. The registration process accounts for motion of the camera by determining the frame-to-frame x-y offsets, zoom and rotation. At step 645, frame overlay is performed. At step 650, the video mosaic can be viewed. At step 655 the process is ended.

Please replace the paragraph beginning on page 9, line 18 with the following:

Refer now to Figure 7 where [were] at step 705 the process is started. At step 710, the centroid region of interest (ROI) is calculated. At step 715, the centroid is compared with centroids of the next [to] adjacent frame. At step 720, centroids are selected which are within

[ariel] error tolerances. At step 725, there is a full correlation of average distance from every pixel and corresponding structure. At step 730, if the difference is consistent the structure is identified as a potential match. At step 735, steps 705-730 are repeated for other structures that fall within error tolerance. At step 740, the stored difference calculations are analyzed and select matches are based on pixels within structure having the most consistent differences. The analysis includes looking for frame-to-frame location as indicated by the difference calculation. This consistency will yield x-y translation, rotation and focal length changes.

Please replace the paragraph beginning on page 10, line 1 with the following:

Now referring to Figure 8, the process is started at step 805. At step 810, the frame is searched for an edge. At step 815, adjacent "on" pixels are followed until an "off" pixel is detected. At step 820, [it is determined] the locations of the "on" are determined pixels and these locations are stored. At step 825, the number of "on" pixels is counted within the structure which must exceed a preset threshold. At step 830, the value of the pixels within a designated structure is changed to avoid use in future structures. At step 835, steps 805-830 are repeated until the entire images in structure detected. At step 840, the process is ended.

Please replace the paragraph beginning on page 10, line 9 with the following:

As depicted in Figure 9, five video frames are extracted which were taken at 30 frames a second. Thus, there are video frames 910, 920, 930, 940 and 950 which are extracted from a data library. The data [date] library can be onboard the UAV.

Please replace the paragraph beginning on page 10, line 25 with the following:

Referring now to Figure 14, a flow diagram summarizing the steps of the present invention is illustrated. At step 1405, the process is started. At step 1410, a low resolution image registration is performed for a sequence of images. At step 1415, each of the images upsampled. As depicted in Figures 10 and 11, the images are upsampled by factor 4. Other upsampling factors could be used, but the factor of 4 appears to be optimal, yielding the most consistent results. Less than 4 could be used, but the idea is to create the highest resolution possible. Using a factor greater than 4 will result in diminishing returns, in that the amount of memory and processor capacity required will not necessarily produce [product] a sufficiently

higher quality image. At step 1420, an x, y registration is performed for the upsampled images. At step 1425, the upsampled images are then aligned[. Using] using a simple correlation technique to determine the x-y frame-to-frame offsets. At step 1430, these aligned, upsampled images are then combined into a high resolution output image by performing a pixel-by-pixel average across all 5 of the upsampled aligned images. At step 1435, the process is ended.